



UNITED STATES PATENT AND TRADEMARK OFFICE

h2
UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/622,607	07/18/2003	Xiaochun Linda Chen	2003 P 50508 US	4285
48154	7590	09/24/2007	EXAMINER	
SLATER & MATSIL LLP 17950 PRESTON ROAD SUITE 1000 DALLAS, TX 75252			SUCH, MATTHEW W	
		ART UNIT	PAPER NUMBER	
		2891		
		MAIL DATE		DELIVERY MODE
		09/24/2007		PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/622,607	CHEN ET AL.	

Examiner	Art Unit	
Matthew W. Such	2891	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 28 June 2007.
 2a) This action is FINAL. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-11, 14, 26-28 and 30-38 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) Claim(s) 7-11, 14 and 34-38 is/are allowed.
 6) Claim(s) 1-6, 26-28 and 30-33 is/are rejected.
 7) Claim(s) _____ is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____
3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)	5) <input type="checkbox"/> Notice of Informal Patent Application
Paper No(s)/Mail Date _____	6) <input type="checkbox"/> Other: _____

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, at least the substrate, further layer of resist, etched hard mask, pad oxide, pad nitride, and trench must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

2. Claims 26 and 33 are objected to because of the following informalities: the recitations of “the device region” should read “the [said] inner device region”. Appropriate corrections are required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 26-28, 30 and 32-33 are rejected under 35 U.S.C. 102(b) as being anticipated by Perng ('570).

5. Regarding claim 26-27, 30 and 32, Perng teaches a method of forming providing a silicon wafer (Element 10; Col. 3, Line 14) that includes a top surface (see “front” Element 14; Col. 3, Lines 18-19) that includes a periphery region on the top surface of the wafer (area of top covered by Element 16) that surrounds an inner device region (Element 14) on the top surface of the wafer. A ring of resist material (Element 18 or alternatively, Element 24, since the claim does not limit what the resist material can be) is formed over the top surface of the wafer to separate the periphery region from the device region (as discussed above the “periphery” and “device

region” are defined). This is accomplished without a lithography step since the resist is formed on the back surface of the wafer and it also deposits over the edges and onto the top surface (Col. 3, Lines 33-40) or (in the case of the resist being Element 24) it is formed by a CVD process (Col. 3, Lines 55-67). The forming step comprises forming the ring of material over a hard mask layer (Element 16) which is disposed over the wafer. A plurality of devices, such as DRAM capacitors, are formed in the device region at the top surface of the wafer (Col. 3, Lines 18-19; Col. 4, Lines 4-7).

6. Regarding claim 28, Perng further teaches that the forming step comprises depositing material in a region between the periphery of the wafer and a region between the periphery and the inner device region. Since the claim does not define characteristics which distinguishes “the periphery” from “a region between the periphery and the inner device region”, any arbitrary area can be interpreted as such since inner device region is defined (Element 14).

7. Regarding claim 33, Perng teaches that the plurality of devices formed in the front inner device region of the wafer are formed by lithography (Col. 4, Lines 7-11). Perng teaches that a resist (Element 26) is deposited over the area for lithography to be formed, covering the inner device region and ring of material (Fig. 6, for example). The resist is patterned by deep trench lithographic etching (Col. 4, Lines 7-11) and the wafer is altered in alignment with the patterned layer of resist by RIE (Col. 4, Lines 7-11). The Examiner notes that the manner in which the claim is written does not limit what the resist material can be, so therefore, the glass layer of Perng is used as a resist.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Perng ('570) in view of Wolf (Silicon Processing, Vol. 1).

Perng does not explicitly teach that the ring of material (Element 18) comprises an organic material, but does teach that the material is a conventional resist (Col. 3, Lines 38-40). Wolf teaches that conventional resist materials are organic materials (pages 418-423). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an organic material as the resist material forming the ring of material since organics are highly conventional resist materials. It has been held that the selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

10. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Perng ('570) in view of Wolf (Silicon Processing, Vol. 1).

Art Unit: 2891

11. Regarding claims 1 and 6, Perng teaches a method of forming providing a silicon wafer (Element 10; Col. 3, Line 14) that includes a top surface (see “front” Element 14; Col. 3, Lines 18-19) that includes a periphery region on the top surface of the wafer (area of top covered by Element 16) that surrounds an inner device region (Element 14) on the top surface of the wafer. A ring of resist material (Element 18) is formed over the top surface of the wafer to separate the periphery region from the device region (as discussed above the “periphery” and “device region” are defined). A plurality of devices, such as DRAM capacitors, are formed in the device region at the top surface of the wafer (Col. 3, Lines 18-19; Col. 4, Lines 4-7). No devices are formed in the periphery since it is covered by a protective pad layer (Element 24) during device fabrication. Perng does not explicitly teach that the ring of material comprises an organic material, but does teach that the material is a conventional resist (Col. 3, Lines 38-40).

Wolf teaches that conventional resist materials are organic materials (pages 418-423). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an organic material as the resist material forming the ring of material since organics are highly conventional resist materials. It has been held that the selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

12. Regarding claim 2, Perng teaches that the ring of resist material (organic resist, as taught by Wolf as shown above) is disposed atop a hard mask layer (Element 16).

13. Regarding claim 3, Perng further teaches that the forming the ring of organic material step (organic resist, as taught by Wolf as shown above) comprises depositing material in a region between the periphery of the wafer and a region between the periphery and the inner device region. Since the claim does not define characteristics which distinguishes "the periphery" from "a region between the periphery and the inner device region", any arbitrary area can be interpreted as such since inner device region is defined (Element 14).

14. Regarding claim 4, Perng further teaches that the forming step comprises depositing organic material atop all of the substrate and patterning the organic material to form the ring of organic material (Figs. 3-4). The patterning is accomplished by turning the substrate upside down leaving a ring on the front side.

15. Regarding claim 5, Perng further teaches that a resist layer (Element 16, since the claim, as written, does not limit what type of material a resist is) prior to forming the ring of organic (organic resist, as taught by Wolf as shown above) material (Figs. 2-3, and associated description, for example).

Allowable Subject Matter

16. Claims 7-11, 14 and 34-38 are allowed.

Art Unit: 2891

17. The following is an examiner's statement of reasons for allowance:

- a. Regarding claim 34, a search of the prior art does not disclose or reasonably suggest a method disclosing the combination of limitations claimed. Specifically, the oxide/nitride/hardmask configuration with a patterned resist layer forming a ring of resist and depositing a further layer of resist atop the ring of resist; further including patterning the further layer of resist, etching the hardmask with the patterned resist layers, removing the further layer of resist, and etching a trench with the ring of resist remaining after the trench is etched.
- b. Regarding claim 7, a search of the prior art does not disclose or reasonably suggest a method disclosing the combination of limitations claimed. Specifically, forming a positive resist on a substrate and patterning the positive resist to form a ring, then after removing the patterned resist another resist layer is formed on the substrate and on the positive resist remaining and exposing the other resist within the ring to form a patterned region, leaving the other resist on the ring of positive resist unpatterned.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

18. Since claim 7 is allowable, the restriction requirement between species I and II, as set forth in the Office action mailed on 22 May 2006, has been reconsidered in view of the

Art Unit: 2891

allowability of claims to the elected invention pursuant to MPEP § 821.04(a). **The restriction requirement is hereby withdrawn as to any claim that requires all the limitations of an allowable claim.** Claims 9 and 10, directed to the withdrawn species, are no longer withdrawn from consideration because the claim(s) requires all the limitations of the allowable claim 7.

In view of the above noted withdrawal of the restriction requirement, applicant is advised that if any claim presented in a continuation or divisional application is anticipated by, or includes all the limitations of, a claim that is allowable in the present application, such claim may be subject to provisional statutory and/or nonstatutory double patenting rejections over the claims of the instant application.

Once a restriction requirement is withdrawn, the provisions of 35 U.S.C. 121 are no longer applicable. See *In re Ziegler*, 443 F.2d 1211, 1215, 170 USPQ 129, 131-32 (CCPA 1971). See also MPEP § 804.01.

Conclusion

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Nakayama ('315) teaches a variety of methods for preventing shining spots or black silicon on wafers during device fabrication processes.

20. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew W. Such whose telephone number is (571) 272-8895. The examiner can normally be reached on Monday - Friday 9AM-5PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bradley W. Baumeister can be reached on (571) 272-1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2891

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Matthew W. Such
Examiner
Art Unit 2891

MWS
9/15/07



B. WILLIAM BAUMEISTER
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800